

CLAIMS

1. A composite planetary device, comprising:

a planetary gear mechanism equipped with a sun gear, at least one planetary gear and an internal gear and a planetary roller mechanism equipped with a sun roller, at least one planetary roller and a ring roller, wherein the sun gear and the sun roller are integrally rotated around a common rotating center axis, the corresponding planetary gear and the planetary roller are integrally rotated around a common planetary shaft, and the internal gear and the ring roller rotate integrally around the rotating center axis or can be fixed concentrically,

wherein a radius of the sun roller is larger by Δr_1 than a radius r_1 of a working pitch circle of the sun gear,

a radius of the planetary roller is smaller by Δr_1 than a radius r_{21} of a working pitch circle of the planetary gear,

the radius r_{21} of the working pitch circle of the planetary gear meshing with the sun gear is larger than a radius r_{23} of a working pitch circle of the planetary gear meshing with the internal gear.

2. The composite planetary device according to claim 1, wherein

gears of the planetary gear mechanism have numbers of teeth that satisfy equation (1),
the radius of the sun roller is larger than the radius of the working pitch circle of the sun gear by a radius increase amount Δr_1 given by equation (2),

the radius of the planetary roller is larger than the radius of the working pitch circle of the planetary gear meshing with the internal gear by an amount Δr_2 given by equation (3).

$$j = (Z_d - Z_a)/2 - Z_b > 0 \quad (1)$$

Here j : Planetary gear teeth reduction number

Z_a : Number of sun gear teeth

Z_b : Number of planetary gear teeth

Z_d : Number of internal gear teeth

$$\Delta r_1 = \frac{r_{21} - r_{23}}{r_{23} \left(1 + \frac{r_1}{r_{21}}\right) - \frac{r_1 \left(1 - \frac{r_{23}}{r_3}\right)}{r_3} + 1} \quad (2)$$

Here r_1 : Radius of working pitch circle of sun gear

r_{21} : Radius of the working pitch circle of the planetary gear meshing with the sun gear

r_{23} : Radius of the working pitch circle of the planetary gear meshing with the internal gear

r_3 : Radius of the working pitch circle of the internal gear

$$\Delta r_2 = r_{21} - r_{23} - \Delta r_1 \quad (3)$$